DENTASCAN: AN INEVITABLE TOOL IN IMPLANT DENTISTRY

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INTRODUCTION

For centuries man has struggled to find answers to the complex problems associated with tooth loss. Many have dreamed of replacing missing teeth with the look, feel and function of natural teeth. Dental implants have made it possible to quite an extent.

A dental implant is an artificial tooth root that is places into one's jaw to hold a replacement tooth or bridge. Dental implants are an ideal option for people in good general oral health who have lost a tooth or teeth due to periodontal disease, an injury, or some other reason.

Since Implant surgery is exacting, the procedure demands lot of precision to be followed while executing it. The anatomy of the specified area plays an important role in the success or failure of an Implant and this is the reason why one needs to do a careful pre-operative planning to avoid failure. Conventional radiographs, which are 2-D informative devices, do provide relevant information but lacks anatomical insight.

Implantology is one area where image processing has contributed significantly to the advancement of diagnostic and therapeutic capabilities.

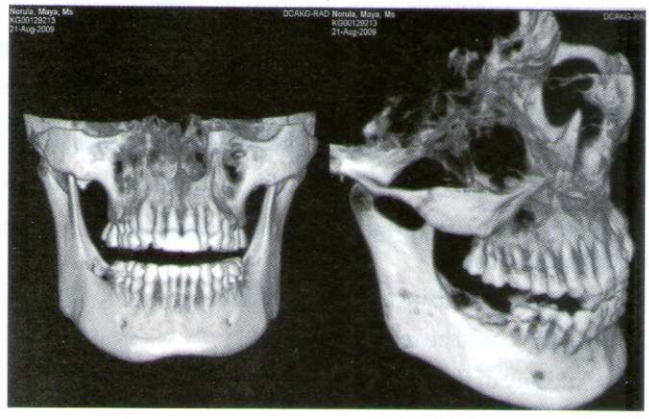
Imaging of the Dentofacial structures is one of the areas that has been most influenced over the last two decades by the technological advancement in image processing from simple reformatting programmes to a wide range of complex post-processing methods aimed at revealing further information from the available image data. This development has also lead into significant fall in both processing time and cost of technology. The result in facial imaging is that some of these techniques are, or should be, regarded as routine in the clinical management of disease.

FUNCTIONING OF DENTASCAN:

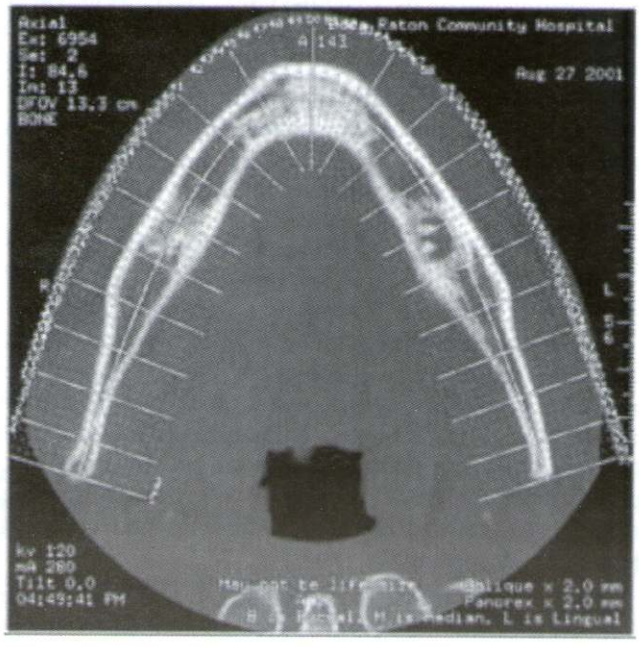
DentaScan is a unique new computer software program which provides computed tomographic (CT) imaging of the mandible and maxilla in three planes of reference i.e. axial, panoramic, and oblique sagittal (or cross-sectional). The clarity and identical scale between the various views permits uniformity of measurements and cross-referencing of anatomic structures through all three planes. Unlike previous imaging techniques, the oblique sagittal view permits the evaluation of distinct buccal and lingual cortical bone margins, as well as clear visualization of internal structures, such as the incisive and inferior alveolar canals.

DentaScan provides the surgeons an operation with information of the internal structures that cannot even be gained by direct intra-operative visualization. Axial scans at 1 mm are obtained continuously through either the maxilla or mandible. Using the axial scan through the roots of the teeth, the curvature of the alveolar ridge is drawn on the computer screen.

Dentascan is actually a computerized reformatting program which gives true cross-sectional details of the bony tissues of either arch. This provides inside details of the type(type I to type IV) and quality of bones in the terms like whether the central part of bone is soft or hard .it also provides the exact amount of bone available especially adjacent to critical areas of vital structures.

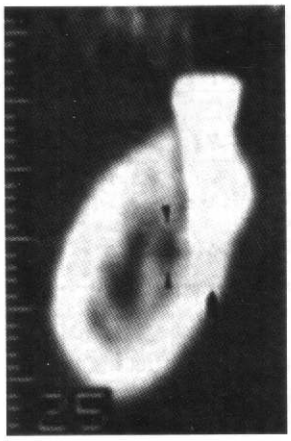


Pic. : Dentascan of Maxilla and Mandible.



Pic. : Axial Scan of Mandible.

Pic. : Cross-Section Oblique View of Mandible showing Mandibular Canal.



PREPERATION OF PATIENTS FOR DENTASCAN:

Since the procedure is totally non-invasive in nature, the examination is very simple and painless and it can be performed within a short span of time. It is advisable to

1. Wear loose, comfortable clothing without metal snaps or zippers, such as cotton suits or sarees. sometimes one might be asked to change to hospital clothing
2. Do not wear any makeup or jewelry
3. Remove dentures, wigs, hairpins and hearing aids
4. Please notify the radiographer staffs if you are pregnant or breastfeeding
5. Patients who are allergic to food or drugs like Iodine, should be medicated accordingly prior to the exam

Before the examination.

Individual is invariably advised to reach few minutes in advance so that

1. proper specific instructions could be given,
2. Health could be reviewed
3. And any of the relevant queries could be answered

During the examination:

Total procedure of scanning lasts about 15-20 minutes. Upon entering the CT scan suite, a technologist will position you on the scanning table. The table will then automatically move into place for imaging. You will be asked to remain as still as possible during the actual imaging process because movement can blur the final images. However, slight movement is allowed between sequences.

After the examination:

When the exam is complete, you may be asked to wait until the images are reviewed to make sure that no additional imaging is necessary.

When the exam is complete, a specialized radiologist who has expert ise in reading the images from those specific area of the body will review the images from your examination. The radiologist will prepare a detailed report to share with your doctor. Images are provided on film, photo paper, or DICOM CD, all of which allow the clinician to reaffirm his clinical findings and can plan procedures accordingly.

Dentascan provides imaging information in the following forms. The Information contains about available bone width at various sites as well as the bone density.

Divisions of Bone for Implant Dentistry**

Division	Width	Height
A	≥5 mm	≥12 mm
B	2.5 - 5 mm	≥12 mm
C	0 - 2.5 mm (c-w)	<12 mm (c-h)
D	Severe Atrophy, Basal bone loss= Flat maxilla/Pencil thin mandible.	

Hounsfield Unit (HU) Bone Density Classification**

D1 Bone**	>1200HU
D2 Bone**	850 - 1200HU
D3 Bone	350 - 850HU
D4 Bone**	150 - 350HU
D5 Bone**	<150 HU

INDICATIONS OF DENTASCAN:

1. Pre-operative evaluation of Implants
2. Find out whether there is any kind of encroachment of mandibular canal, maxillary sinus or Nasal cavity following implant placement.
3. Evaluate late complications like peri-Implantitis.
4. Diagnosis of cysts and Tumors of Jaws.
5. Assessment of of Dental and peridental Inflammatory diseases'
6. Imaging of Oro-antral fistula.
7. Assessment of vertical root fractures

ADVANTAGES OF DENTASCAN:

1. Multiplanar Reformations of images
2. Exact information about alveolar bone dimensions
3. Location of mandibular canal and maxillary sinuses
4. Eliminate streak artifacts.
5. Dentascan helps in measuring Bone Quantity i.e. height and bucco-lingual dimensions of the ridge at the Proposed Implant site
6. Helps in measuring bone volume
7. Helps in precise localization of vital structures.
8. Minimal additional cost
9. Low radiation doses

LIMITATIONS OF DENTASCAN:

1. The image may not be of the true size and may require compensation for magnification.
2. Determination of Bone quality requires additional aids
3. It has a limited range of diagnostic gray scale

CONCLUSIONS:

Facial imaging is one of the areas that has been most influenced over the last two decades by the dramatic move of image processing from simple reformatting programmes to a wide range of complex post-processing methods designed to extract further information from image data. This development has been aided by

significant falls in both processing times and cost of technology. The result in facial imaging is that some of these techniques are, or should be, regarded as routine in the clinical management of disease.

Dental and maxillary applications are not the most common in overall imaging practice but they represent areas where image processing has contributed significantly to the advancement of diagnostic and therapeutic capabilities.

Dentascan creates a comprehensive set of cross-referenced composite axial, panorex, and oblique planar reformations of the mandible and/or maxilla. This tool is for planning mandibular and maxillary or dental implant surgery.

Dentascan is basically a radiological technique, which utilizes new CT software program for the evaluation of alveolar bone height and width. Irradiation is kept within acceptable limits when this technique is used. Measurements obtained with this technique are far more accurate when compared with those obtained on panoramic radiographs. 'Dentascan' can sometimes show possibilities to place implants on the buccal side of the canal when no possibilities are present above the canal on both the panoramic radiographs and Denta scan images. In the maxillary region Dentascan avoids unnecessary interventions by demonstrating the insufficient width of the alveolar ridge, often missed on panoramic radiographs The high resolution (1 mm) computerized images of the maxilla or mandible allow clinicians to take precise measurements of the potential dental implant sites, as well as, to access the mineralization or density of the involved bone site.This allows the use of implants with optimal length and diameter with a resulatant better long-term results.

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